CPS SC Series Grid-tied PV Inverter
CPS SC14KTL-DO/US-208

Installation and Operation Manual

Ver 1.1

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Before You Start…

This manual contains important information regarding installation and safe operation of this unit. Be sure to read this manual carefully before using.

Thanks for choosing this CPS Grid-tied PV Inverter. This PV Inverter is a high performance and highly reliable product specifically designed for the North American Solar market.

If you encounter any problems during installation or operation of this unit, first check this manual before contacting your local dealer or supplier. Instructions inside this manual will help you solve most installation and operation difficulties.

Please keep this manual on hand for quick reference.

Chapter 1 IMPORTANT SAFETY INSTRUCTIONS (SAVE THESE INSTRUCTIONS)

Please read this user manual carefully before product installation. CPS reserves the right to refuse warranty claims for equipment damage if the user fails to install the equipment according to the instructions in this manual.

Warnings and symbols in this document

	DANGER: DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	WARNING: WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION: CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
	NOTICE: NOTICE indicates a hazardous situation which, if not avoided, could result in equipment working abnormally or property loss.
	INSTRUCTION: INSTRUCTION indicates important supplementary information or provides skills or tips that can be used to help you solve a problem or save you time.

Markings on the product

	HIGH VOLTAGE: The product works with high voltages. All work on the product must only be performed as described in this document.
	HOT SURFACE: The equipment is designed to meet international safety standards, but surfaces can become hot during operation. Do not touch the heat sink or peripheral surfaces during or shortly after operation.
	EARTH GROUND: This symbol marks the location of grounding terminal, which must be securely connected to the earth through the PE (protective earthing) cable to ensure operational safety.

DANGER:

Please disconnect the inverter from AC grid and PV modules before opening the equipment. When the PV array is exposed to light, it supplies DC voltage to this equipment. Make sure hazardous high voltage and energy inside the equipment has been discharged.

Do not operate or maintain the inverter until at least 5 minutes after disconnecting all sources from DC and AC sides.

WARNING:

All the installation and cable connections should be performed only by qualified technical personnel. Disconnect the inverter from PV modules and the Power Grid before maintaining and operating the equipment.

NOTICE:

This inverter is designed to connect AC power only to the public grid. Do not connect the AC output of this equipment directly to any private AC power equipment.

CAUTION:

CPS SC14KTL-DO inverter is approx **64kg (≈141 pounds)**.

Please ensure the mounting is properly installed before hanging the the inverter on the bracket.

Chapter 2 Overview

2.1 Inverter for grid-tied PV systems

CPS SC14KTL-DO/US-208 inverter is suitable for use with various commercial rooftop systems and distributed power station systems. Normally, the system mainly consists of PV modules, DC power distribution equipments, PV inverter and AC power distribution equipments (Figure 2-1). The inverter converts the DC from PV modules to AC with the same frequency and phase as the AC grid. All or part of the AC power is supplied to local loads, and the surplus power is supplied to the electricity grid.

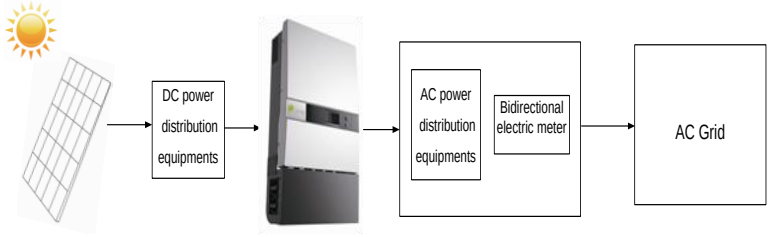


Figure 2-1 Grid-tied PV system

2.2 Product features

The two-MPPT design has the benefit of increasing the power generating efficiency of the whole PV system. The inverter has 2 MPPTs, so a separate array can be controlled by an independent Maximum Power Point Tracking (MPPT) control circuit. This means that the two arrays can be installed in different positions and orientations.

The transformerless design of inverter with the benefit of small size, light weight, high power density, flexible installation and convenient maintenance provides the best cost performance for the whole PV system.

2.3 Circuit structure design

The basic schematic diagram of CPS SC14KTL-DO/US-208 is shown in Figure 2-2. The input DC passes through surge protection circuitry, DC EMI filter, and the boost circuit to achieve maximum power tracking and boost up voltages. The inverter converts the DC energy to 3-phase AC energy. The high frequency components of AC voltage are removed with a line filter. Then the 3-phase AC energy is sent through two-stage relays and EMI filter to produce high quality AC power.

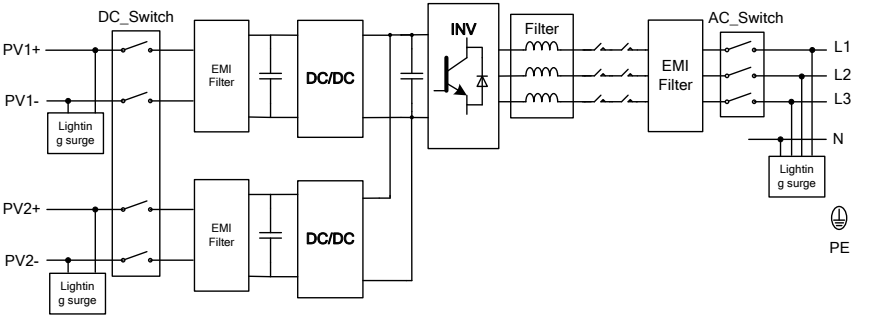


Figure 2-2 Schematic diagram of CPS SC14KTL-DO/US-208

2.4 Appearance description

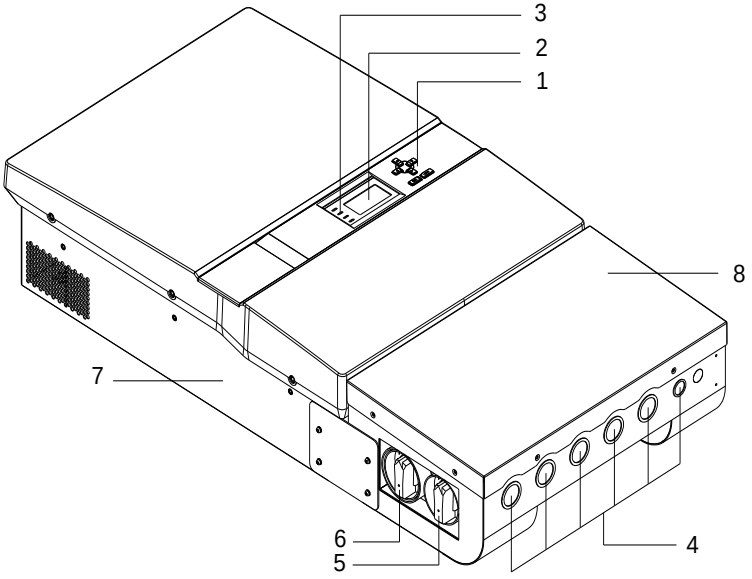


Figure 2-3 Appearance sketch of CPS SC14KTL-DO/US-208

Description of main items of CPS SC14KTL-DO/US-208 (See Figure 2-3):

1. LCD key buttons: operate the functions and change settings of inverter
2. LCD display: indicates data
3. LED indicator lights: indicate the status of inverter
4. Holes for cable entry
5. DC switch: control the DC power on and off
6. AC switch: control the AC power on and off
7. Main housing
8. Wiring box

Chapter 3 Installation

Below is the installation instruction of the inverter. Please read carefully and install the product step-by-step.

Before installation, please check that the following items are included in the package:

Table 3-1 Main items

No.	Item	Q'ty	Note
(1)	CPS SC14KTL-DO/US-208 Grid-tied PV inverter	1	
(2)	Mounting bracket	1	
(3)	Installation and operation manual	1	
(4)	Warranty card	1	
(5)	Accessory kit	1	contains all necessary accessories

The (5) Accessory kit contains items listed below:

Table 3-2 Accessories

Item	Q'ty	Purpose
M8x25 Expansion bolts&nuts	8 pairs	for bracket installation
OT type terminal	1	For ground cable
Pre-insulated end ferrule	20	16 for DC input cables, 4 for AC output cables
RJ45 connecters	4	for communication cables
Flange M5 nut	2	for ground cable

INSTRUCTION:

The items in the accessory kit table above are for the standard configuration. The accessories may vary if optional parts are purchased.

3.1 Recommendation before installation

- ✓ Check that the product environmental specifications (protection degree, operating temperature range, humidity and altitude, etc) meet the requirements of the specific project location;
- ✓ Make sure that the power grid voltage is within normal range;
- ✓ Ensure that the local electricity supply authority has granted permission to connect to the grid;
- ✓ Installation personnel must be qualified electricians or people who have received professional training;
- ✓ Sufficient space is provided to allow the inverter cooling system to operate normally;
- ✓ Install the inverter away from flammable and explosive substances;
- ✓ Avoid installing the inverter in locations that exceed the temperature limits specified in the inverter data sheet to limit undesirable power loss;
- ✓ Do not install the inverter near the electromagnetic source which can compromise the normal operation of electronic equipment;

3.2 Mechanical installation

(1) Dimensions

The dimensions of CPS SC14KTL-DO/US-208 inverter are shown in Figure 3-1.

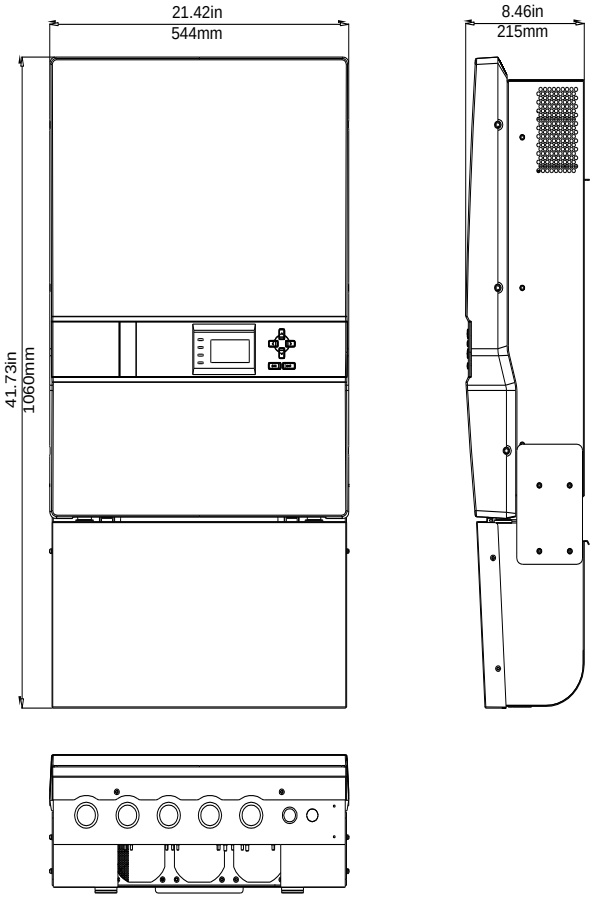


Figure 3-1 Dimensions of CPS SC14KTL-DO/US-208

(2) Installation method

Make sure that the mounting structure (wall, rack, etc) is suitable to support the inverter weight. Follow the mounting guidelines below:

(a) If the location permits, install the inverter vertically.

(b) If the inverter cannot be mounted vertically, it is allowed to be tilted

backward by Max. 15°.

(c) Do NOT mount the inverter forwards.

(d) Do NOT mount the inverter in a horizontal position.

(e) Do NOT mount the inverter upside down.

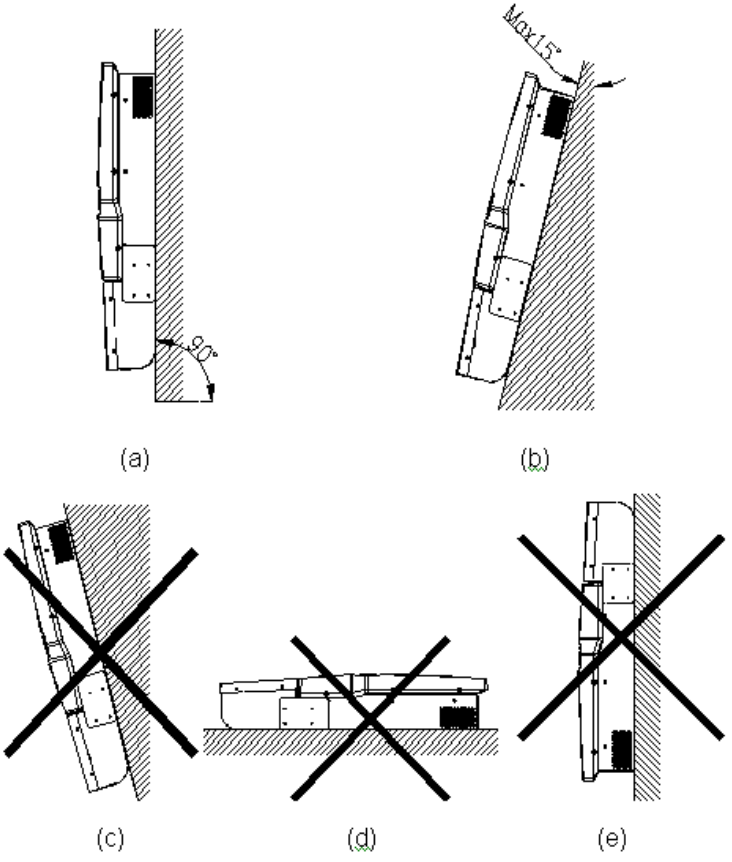


Figure 3-2 Mounting the inverter properly

(3) Space required for inverter mounting on the wall (see Figure 3-3)

The distances between the inverter and the surrounding objects should meet the following conditions: two sides from the walls ≥300mm (11.81in.); top

distance ≥300mm (11.81in.); bottom distance ≥600mm (23.62in.); the minimum spacing between two inverters in parallel ≥600mm (11.81in.).

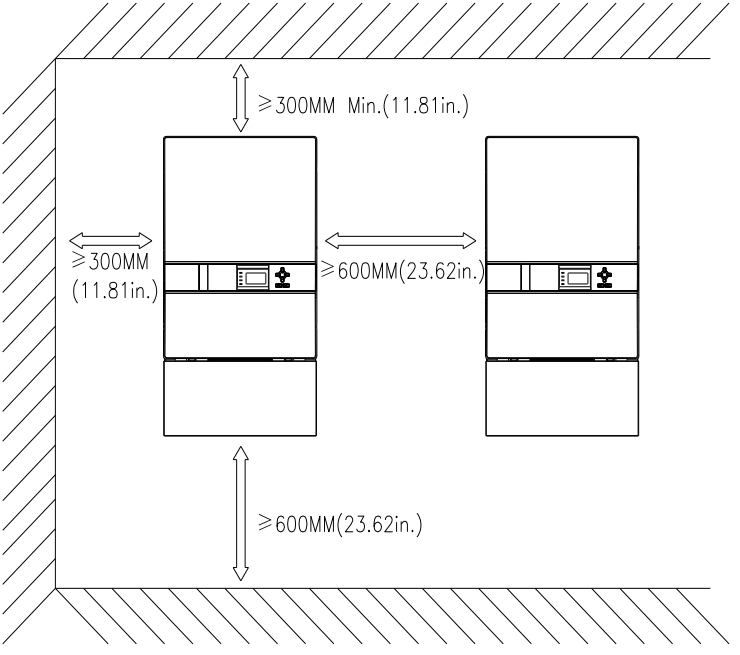


Figure 3-3 Inverter mounting dimensions

(4) Secure the bracket with bolts through the mounting holes and install the inverter:

(a) Mark the 6 bolt holes for mounting the bracket as shown in Figure 3-4;

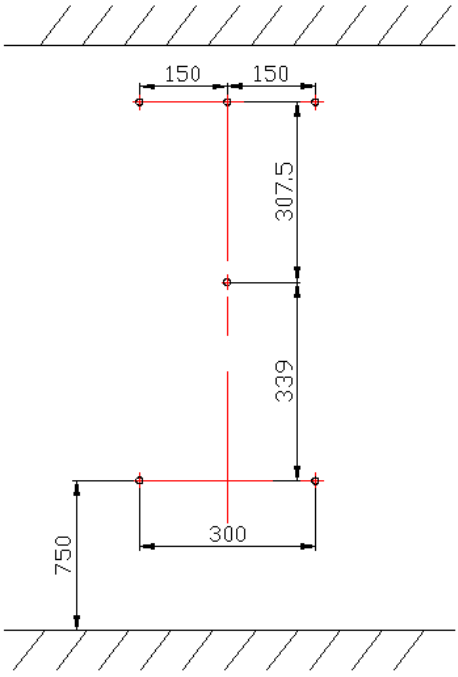


Figure 3-4 Bracket mounting dimensions

(b) Drill holes at the marked positions with a diameter of 0.4in. drill and put the 6 expansion bolts into the holes;

(c) Take the mounting bracket out of the package and secure the bracket on the wall with the 6 nuts in pair as shown in Figure 3-5;

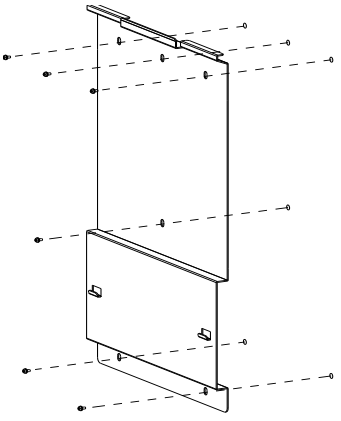


Figure 3-5 Positions of bolt holes on the bracket

(d) Screw off the bolts and remove the two panels on both sides of the inverter as shown in Figure 3-6;

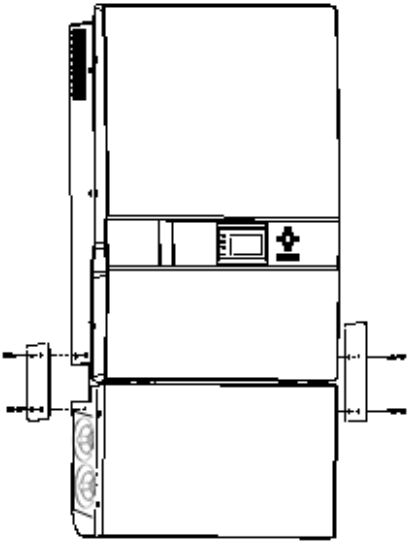


Figure 3-6 Removal of panels before mounting inverter

(e) Two people grab at the position on each side (see Figure 3-7a), lift up the inverter and then hang it on the bracket (see Figure

3-7b~c). Make sure the inverter is securely fixed on the bracket;

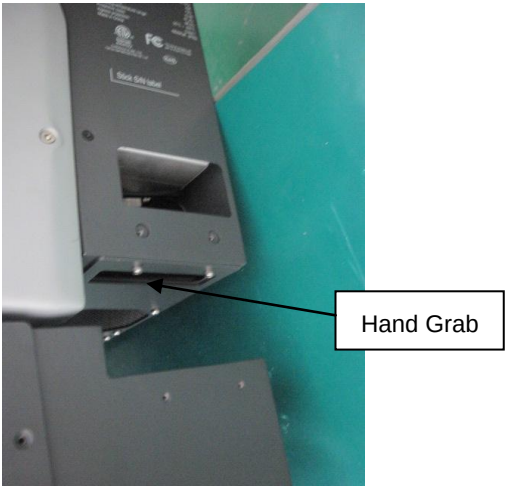


Figure 3-7a Mounting inverter on the bracket

Figure 3-7b Mounting inverter on the bracket

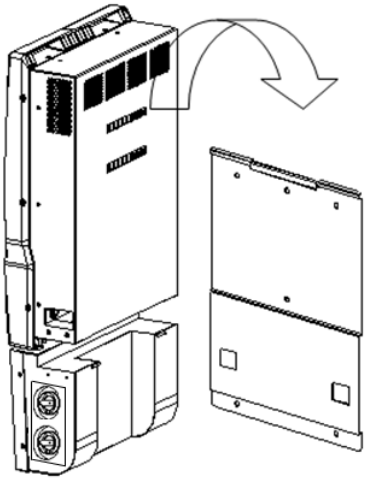


Figure 3-7c Mounting inverter on the bracket

(f) Put the two removed panels back and secure them with 4 M4*12 bolts on each side, as shown in Figure 3-8.

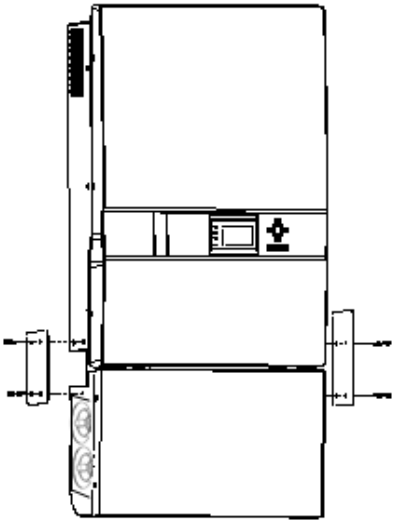


Figure 3-8 Securing panels on both sides

3.3 Electrical installation

Inverter cable terminals of CPS SC14KTL-DO/US-208 are shown in Figure 3-9:

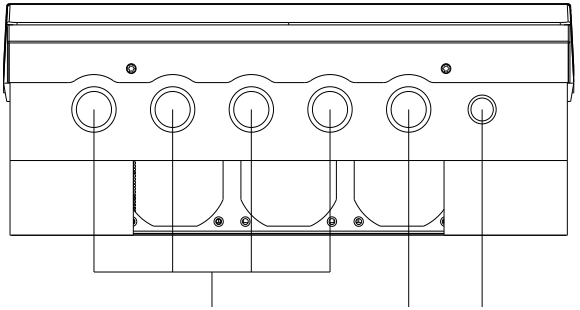


Figure 3-9 Inverter cable terminals

Position	Connection entry
A	Knockout holes for DC input cables
B	Knockout hole for AC output and ground cables
C	Knockout hole for communication cables

3.3.1 DC connection

(1) To ensure the optimal performance of the inverter, please read the following guidelines before DC connection:

(a) First, make sure that the maximum open circuit voltage of the PV modules is lower than 600Vdc under any conditions;

(b) The No. 10-12AWG copper cored soft cables are recommended for DC input connection.

(c) The inverter has 2 MPPTs with 4 DC input strings. Ensure that the Max. DC input current of each string does NOT exceed 10A.

(2) Confirm that the PV modules for each MPPT of the inverter are of the same types and specifications before connection.

(a) Strip the skin 0.4 inch off the cables as shown in Figure 3-10:

Figure 3-10 Wire stripping of DC input

(b) Crimp the terminal as shown in Figure 3-11:

Figure 3-11 Terminal crimping of DC input

(c) The order of cable connection from left to right is PV1+, PV1-, PV2+, PV2-. Connect the PV1- and PV2- to the corresponding fuse socket of the negative pole and connect the PV1+ and PV2+ to the corresponding fuse socket of the positive pole as shown in Figure 3-12:

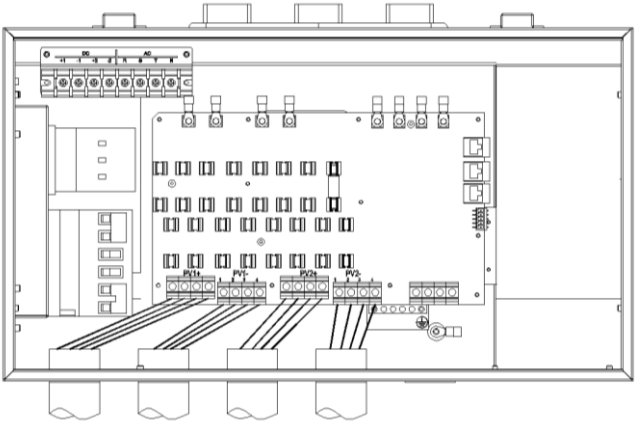


Figure 3-12 Wire connection of DC input

3.3.2 AC and ground connection

The following describes how to connect the AC output and grounding cables between the inverter and the public power grid:

(1) Use the recommended cables:

L1 (Line 1), L2 (Line 2), L3 (Line 3), Neutral and Gnd (Equipment grounding conductor): 8AWG copper cored soft cables

(2) Cable making for AC output:

(a) Strip the skin 0.4 inch off the cables as shown in Figure 3-14:

Figure 3-14 Diagram for wire stripping of AC output

(c) Crimp the terminal as shown in Figure 3-15:

Figure 3-15 Diagram for terminal crimping of AC output

(3) Cable making for grounding:

(a) The Gnd cable (Equipment grounding conductor) is recommended to be green or green with continuous yellow stripes, per National Electrical Code. Strip the skin 0.4 inch off the cables as shown in Figure 3-16:

Figure 3-16 Diagram for wire stripping of grounding conductor

(b) Crimp the terminal with the ring terminal in the accessory kit as shown in Figure 3-17(a) or (b):

Figure 3-17(a) Diagram for terminal crimping of grounding conductor

Figure 3-17(b) Diagram for terminal crimping of grounding conductor

(3) Connection of AC output and ground cables

(a) Connect the L1, L2, L3 and Neutral AC output cables to the corresponding terminals of the socket on the PCB board.

(b) Connect the Gnd cable with a M5 nut at the marked place on the lower right side of the Wiring box, as shown in Figure 3-18(a). The Gnd cable can also be connected to the copper stick as shown in Figure 3-18(b).

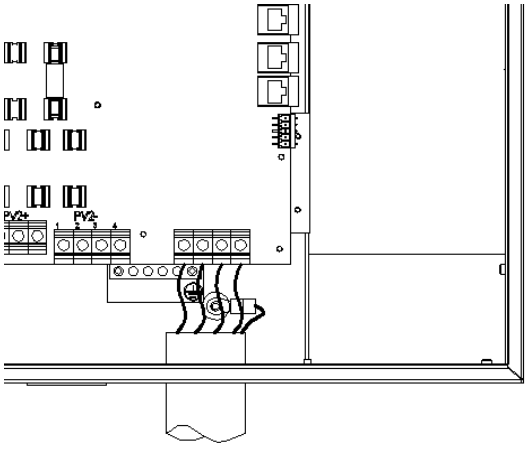


Figure 3-18(a) Diagram of AC output and ground cable connection

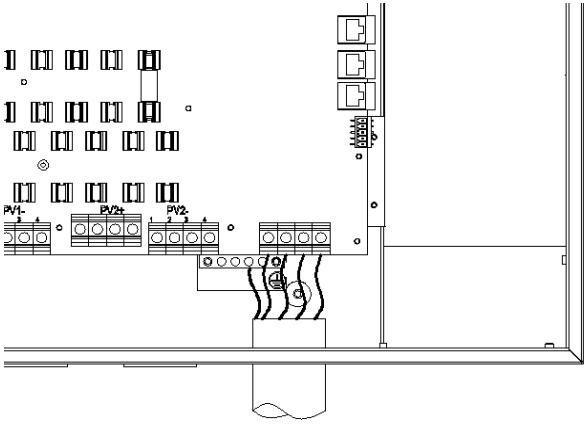


Figure 3-18(b) Diagram of AC output and ground cable connection

3.3.3 Communication connection

1) Standard RS485 communication

There are two RS485 signal ports on the inverter. Shielded cables should be used for communication cables with the maximum length of 3280 feet.

(1) The communication of one single local inverter is to connect the RS485 communication bus cable through the RS485-1 or RS485-2 port of the inverter directly. Wiring requirement of RS485-1/2 is shown in Table 3-9:

Table 3-3 RS485-1/2 wiring requirement

No.	Color	Function
1	White orange	485+
2	Orange	N.C.
3	White green	485-
4	Blue	N.C.
5	White blue	N.C.
6	Green	N.C.
7	White brown	COM
8	Brown	N.C.

(2) The wires are labeled 1~8 from left to right, as shown in Figure 3-19:

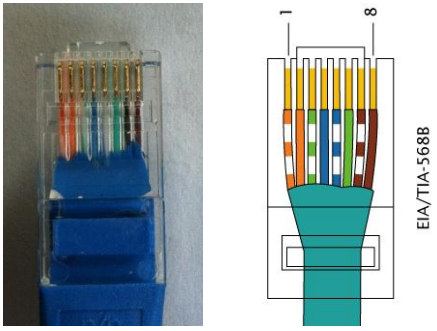


Figure 3-19 Diagram of RS485-1/2 wiring

(3) RS485 network connection:

When the inverters are monitored via the RS485 communication, the unique RS485 address for each inverter can be set through the LCD interface. Up to 31 inverters can be connected together in the RS485 communication network. The Daisy-chain topology is recommended for the RS485 network connection, as shown in Figure 3-20. Other communication topologies, such as the star networks, are not recommended.

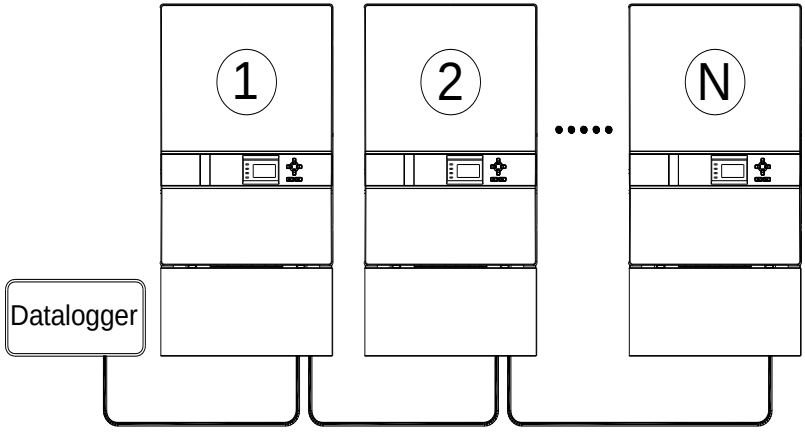


Figure 3-20 RS485 connection between inverters and datalogger

(4) A terminal resistance of 120 ohms connected between Pin 1 and Pin 3 of RS485-1/2 of the last inverter in the multiple inverters string and data logger as shown in Figure 3-20 is recommended.

(5) The connection inside the Wiring box of the inverter after the first one is shown in Figure 3-21:

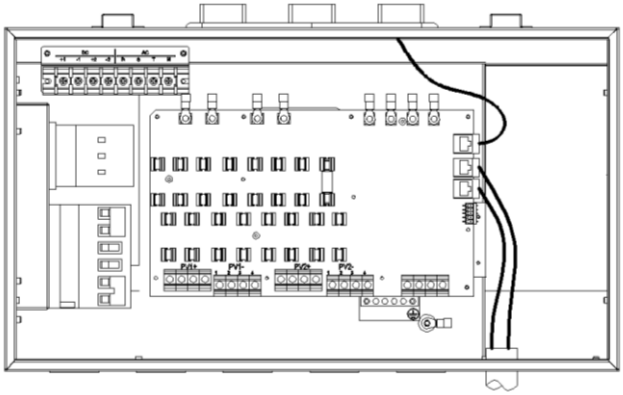


Figure 3-21 Diagram of communication wiring

2) Optional communication card connection

The inverter also supports 2 optional communication methods: Ethernet and ZigBee. Each communication card supports firmware upgrade by USB disk.

INSTRUCTION:

Please remove the communication cables in Figure 3-21 before installing the optional communication card.

a.) Ethernet communication

1. Install the communication card and fasten the 4 screws. (see Figure 3-22)

NOTICE:

Please install the communication card in the wiring box as per the requirement of ESD to avoid damaging the card.

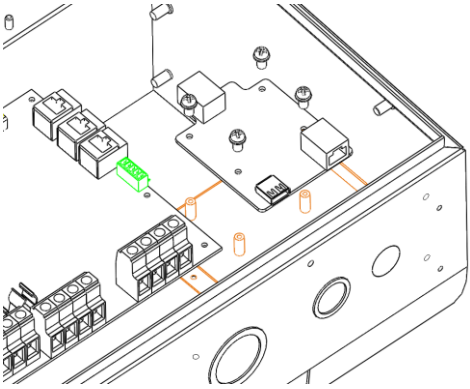


Figure 3-22 Install the Ethernet card

2. Crimp the communication cable, as shown below:

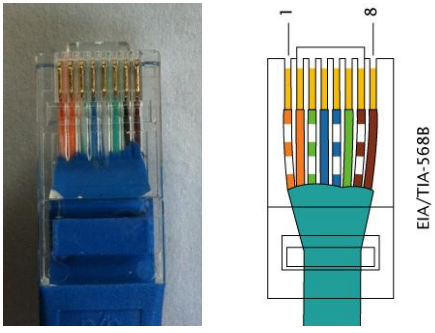


Figure 3-23 Diagram of Ethernet wiring

Table 3-4 Ethernet wiring requirement

No.	Color
1	White orange
2	Orange
3	White green
4	Blue
5	White blue

6	Green
7	White brown
8	Brown

3. Connect the communication cables as figure 3-24(a) or (b):

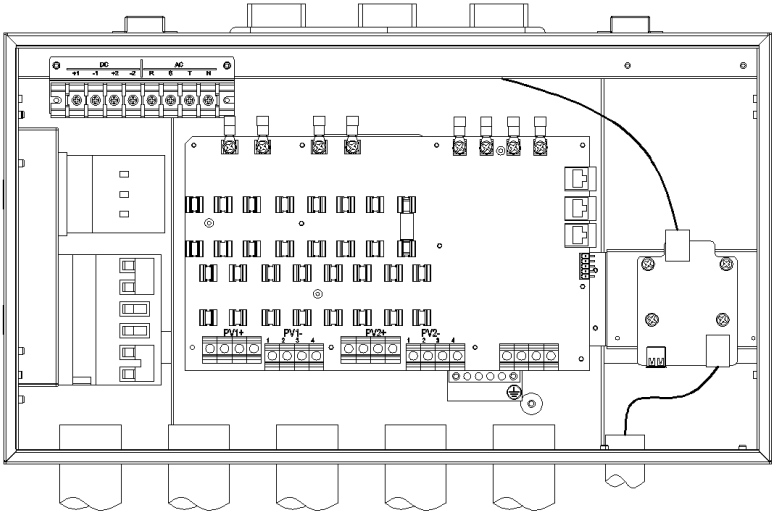


Figure 3-24(a) Cable connection of Ethernet communication

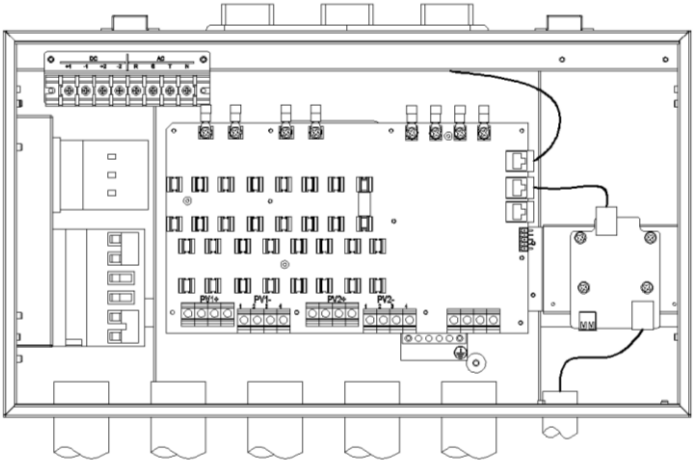


Figure 3-24(b) Cable connection of Ethernet communication

The Ethernet card is equipped with an Ethernet port for TCP/IP communication. The factory default IP address is 192.168.1.100. You may check the IP address by the finder.exe software.

Use the Web Page function embedded in the Ethernet card to input the effective IP address in the IE address bar, such as //192.168.1.100. Then the user can set up the internet parameters and check the real-time information of inverter, etc.

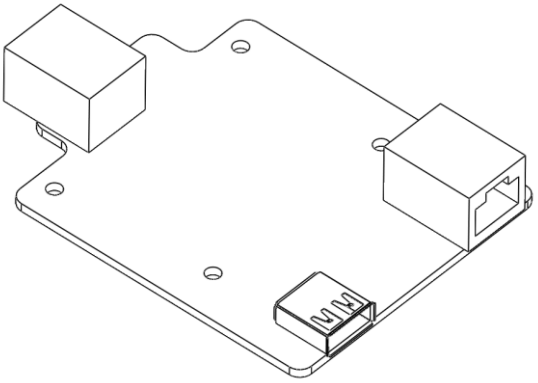


Figure 3-25 Communication port on the Ethernet card

b.) Zigbee communication

1. Install the Zigbee card in the wiring box, and fasten the screws, as follows:

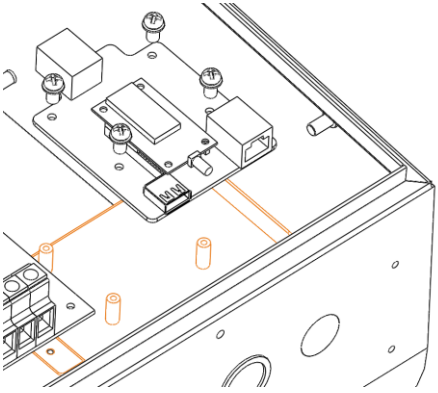


Figure 3-26 Install the Zigbee card

NOTICE:

Please install the communication card in the wiring box as per the requirement of ESD to avoid damaging the card.

2. Install and fasten the cable gland from the inside of the wiring box, as follows:

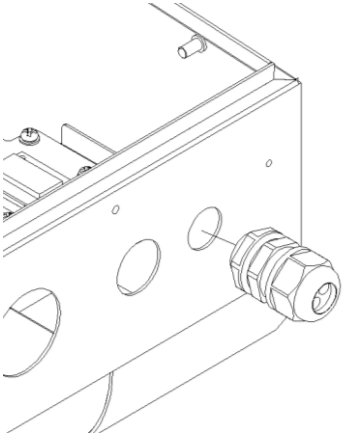


Figure 3-27 Fix the cable gland

3. Fix the antenna on the bottom of the wiring box. Fasten the two screws and put the antenna cable through the cable gland. (see Figure 3-28).

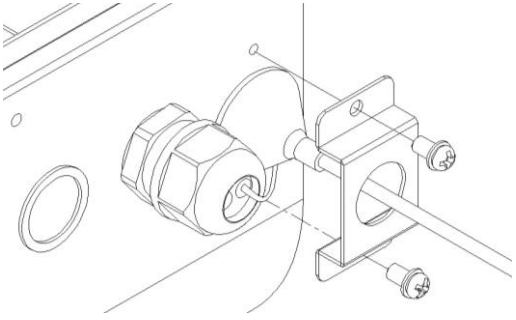


Figure 3-28 Installation of Zigbee antenna

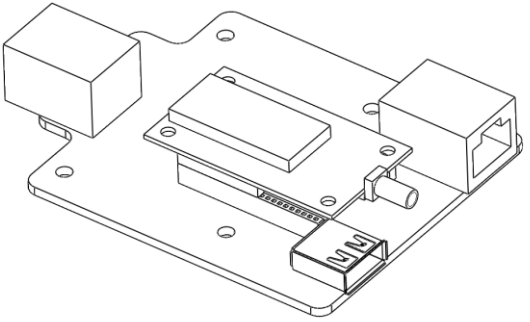


Figure 3-29 ZigbeeCard

4. The Zigbee card supports wireless network communication. The communication frequency is optional from 2.405GHz—2.480GHz and the visible communication distance reaches up to 6561 feet. The Zigbee communication is an excellent choice for the onsite where the communication cables are inconvenient to pave.

The factory default configuration of ZigBeeCard is transit route mode. The communication frequency is 2.480GHz. Network ID is 0xFF. The transmit mode is Master-slave, and the communication baud rate is 9600pbs.

5. Connect the communication cables as follows:

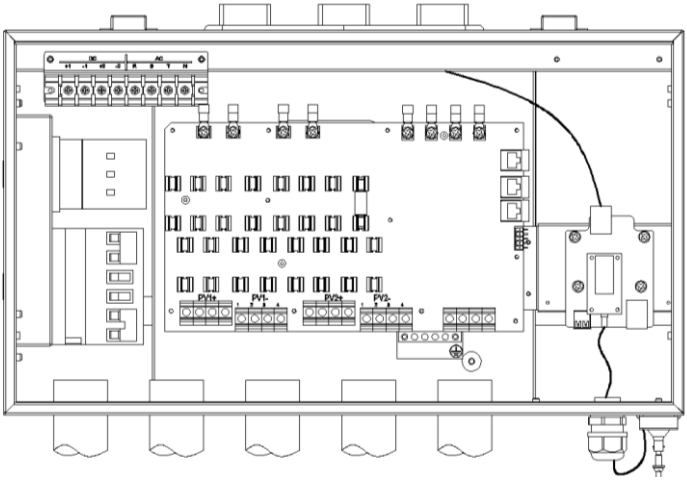


Figure 3-30 Cable connection of Zigbee communication

6. Plug the unused holes on the cable gland with waterproof stick, and fasten the cap of the cable gland.

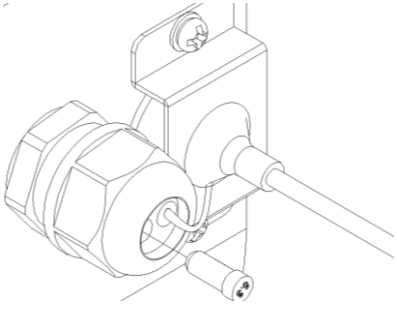


Figure 3-31 Plug waterproof stick into the unused hole

For more information about CPS monitoring solutions, please visit www.chintpower.com/na or contact our after-sales service center.

Chapter 4 Operation

4.1 Start-up

Manual start-up: Manual start-up is required after initial installation or manual (fault) shut-down. Move the cursor from the main operation interface to “4 Setting”. Press ENT and input the password (PAGEUP -> RIGHT -> PAGEDOWN -> LEFT) to access the submenu “1 ON/OFF”. Then move the cursor to “ON” and press ENT to start the inverter. Then the inverter will start up and operate normally if the start-up condition is met. Otherwise, the inverter stands by.

Automatic start-up: The inverter will start up automatically when the output voltage and power of PV modules meet the set point, AC power grid is normal, and the ambient temperature is within allowable operating range.

4.2 Shut-down

Manual shutdown: Normally, manual shutdown is not required. It can be shut down manually if repair or maintenance is required. Move the cursor from the main operation interface to “4 Setting”. Press ENT and input the password (PAGEUP -> RIGHT -> PAGEDOWN -> LEFT) to access the submenu “1 ON/OFF”. Move the cursor to “OFF” and press ENT, and then the inverter will be shut down.

Automatic shutdown: The inverter will shut down automatically when the output voltage and power of PV modules are lower than the set point, or AC power grid fails; or the ambient temperature exceeds the normal range.

4.3 Operation mode

There are 4 operation modes. The following are corresponding indications for each mode.

(1) System check mode for start up, as shown in Figure 4-1:

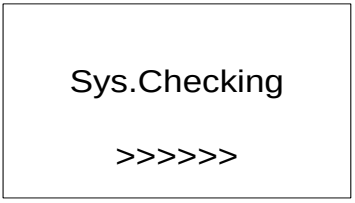
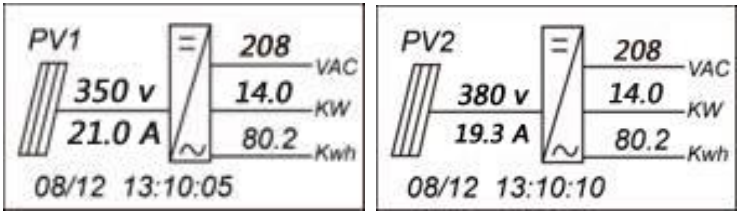


Figure 4-1 System self check ongoing

This mode indicates that the inverter is checking whether it is ready for normal operation after the manual start-up of the inverter.

(2) Normal operation mode: Default indication interface for normal operation of CPS SC14KTL-DO/US-208 is shown in Figure 4-2 (a) and 4-2 (b). The switching time between (a) and (b) is 5 seconds.



(a) (b)

Figure 4-2 Default indication interface for normal operation

In this mode, the inverter converts the power generated by PV modules to AC continuously and feeds into the power grid.

(3) Standby mode, as shown in Figure 4-3:

The inverter will turn into standby mode when the output voltage and power of PV modules do not meet the startup conditions or PV voltage and input power are lower than the set point. The inverter will check automatically whether it meets the startup conditions in this mode until it turns back to normal mode. The inverter will switch from standby mode to fault mode if malfunction occurs.

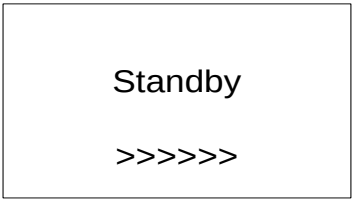


Figure 4-3 Inverter system in standby mode

(4) Fault mode, as shown in Figure 4-4:

The inverter will disconnect from the power grid and turn into fault mode when the inverter or power grid fails. Check the specific cause through “Troubleshooting table” (Table 4-1) in terms of the fault message displayed on the LCD and eliminate the fault according to the instructions.

Figure 4-4 Fault indication interface

WARNING:

All the installation and cable connections should be performed only by qualified technical personnel. Disconnect the inverter from PV modules and the Power Grid before maintaining and operating the equipment.

4.4 Grid connection and power generation

The grid connection and power generation process of CPS SC14KTL-DO/US-208 is automatic. It will check constantly whether AC power grid meets the grid connection and power generation conditions. At the same

time, it will also check whether the DC input of PV modules is sufficient. The inverter will turn into normal operation mode when both of AC and DC conditions are fulfilled. The inverter will disconnect from the power grid and switch to standby mode when the sunlight is weak and power generation is small. The inverter will try to reconnect to the power grid and generate power again when the voltage of PV modules is stable and higher than the set point.

4.5 Fault shutdown

The inverter will be shut down automatically when the PV power generation system fails, such as output short circuit, grid overvoltage / undervoltage, grid overfrequency / underfrequency, high ambient temperature or internal malfunction of the machine.

The causes of fault can be identified based on the faults listed in Table 4-1. Proper treatment is recommended before contacting after-sales service. There are mainly 3 types of faults: alarm, protection and hardware fault.

Table 4-1 Troubleshooting Table

Alarm	1. TempSensorErr	Definition: Prompt detection of abnormal temperature
		Possible causes: 1. Temperature Sensor socket connecter has poor contact; 2. Temperature Sensor is damaged;
		Recommended solutions: 1. Observe temperature display; 2. Switch off 3-phase working power supply and then reboot the system; 3. Contact after-sales service personnel
	2. SPICommErr	Definition: Communication inside inverter fails
		Possible causes: 1. Communication circuits inside inverter are loose; 2. LCD software problem; 3. Inverter software problem;
		Recommended solutions: 1. Observe for 5 minutes and see whether the alarm will be eliminated automatically; 2. Turn off 3-phase working power supply and then reboot the system; 3. Contact our after-sales service center.

	3. IntFanErr	Definition: Fan (invisible from outside) inside inverter is working abnormally
		Possible causes: 1. Fan service life has expired; 2. Fan socket connecter has poor contact.
		Recommended solutions: 1. Observe for 5 minutes and see whether the alarm will be eliminated automatically; 2. Switch off 3-phase work power supply and then reboot the system; 3. Contact after-sales service personnel
	4. ExtFanErr	Definition: The visible fan from outside view is working abnormally
		Possible causes: 1. Fan is blocked; 2. Fan service life has expired; 3. Fan socket connecter has poor contact.
		Recommended solutions: 1. Observe for 5 minutes and see whether the alarm will be eliminated automatically; 2. Check for foreign matters on fan blades; 3. Switch off 3-phase work power supply and then reboot the system; 4. Contact after-sales service personnel
	5. EepromErr	Definition: Internal alarm

		Possible causes: Internal memory has a certain problem
		Recommended solutions: 1. Observe for 5 minutes and see whether the alarm will be eliminated automatically; 2. Contact after-sales service personnel
Protect	1. TempOver	Definition: Ambient temperature or temperature inside inverter is too high
		Possible causes: 1. Ambient temperature outside the inverter is too high; 2. Fan is blocked; 3. Cooling is affected because of incorrect installation.
		Recommended solutions: 1. Confirm that external ambient temperature is within the specified range of operating temperature; 2. Check whether radiation air inlet is blocked; 3. Whether radiation fan is blocked; 4. Check whether the location of installation is appropriate or not; 5. Observe for 30 minutes and see whether the alarm will be eliminated automatically; 6. Contact after-sales service personnel
	2. GridV.OutLim	Definition: Grid voltage exceeds the specified range,

		Possible causes: 1. Grid voltage is abnormal; Power grid breaks down 2. Cable connection between the inverter and the grid is poor;
		Recommended solutions: 1. Observe for 10 minutes and see whether the alarm will be eliminated automatically; 2. Check whether the grid voltage is within the specified range; 3. Check whether the cable between the inverter and power grid is disconnected or has abnormalities; 4. Contact after-sales service personnel
	3. GridF.OutLim	Definition: Grid voltage frequency is abnormal, or power grid is not detected
		Possible causes: 1. Grid frequency has abnormalities; 2. Cable connection between the inverter and the grid is poor;
		Recommended solutions: 1. Observe for 10 minutes and see whether the alarm will be eliminated automatically; 2. Check whether the grid frequency is within the specified range; 3. Check whether the cable between the inverter and power grid is disconnected or has

		abnormalities; 4. Contact after-sales service personnel
	4. PV1(2) VoltOver*	Definition: PV voltage exceeds the specified value
		Possible causes: PV over-voltage
		Recommended solutions: 1. Observe for 30 minutes and see whether the alarm will be eliminated automatically; 2. Check whether PV voltage exceeds the specified range; 3. Turn off the PV input switch, wait for 5 minutes, and then turn on the switch again; 4. Contact after-sales service personnel
	5. PV1(2) Reverse*	Definition: PV module is connected inversely
		Possible causes: PV positive pole and negative pole are connected inversely;
		Recommended solutions: 1. Check whether positive pole and negative pole are connected inversely; 2. Contact after-sales service personnel
	6. GFCI.Err	Definition: System leakage current is too high
		Possible causes: 1. Excessive parasitic capacitance on PV module due to environmental factor;

		2. Grounding is abnormal; 3. Fault inside the inverter
		Recommended solutions: 1. Observe for 10 minutes and see whether the alarm will be eliminated automatically; 2.. Detect whether the electrical connection is abnormal 3. Contact after-sales service personnel
	7. IsolationErr	Definition: Insulation impedance of PV positive to ground or PV negative to ground exceeds the specified range
		Possible causes: Air humidity is high
		Recommended solutions: 1. Observe for 10 minutes and see whether the alarm will be eliminated automatically; 2. Check insulation of PV system; 3. Contact after-sales service personnel
	8. IntProtect0010-0180	Definition: Internal protection of the inverter
		Possible causes: Protection procedure occurs inside the inverter
		Recommended solutions: 1. Observe for 10 minutes and see whether the alarm will be eliminated automatically; 2. Contact after-sales service personnel
Fault	IntFault0010-0150	Definition:

		Internal fault of the inverter
		Possible causes: Fault occurs inside the inverter
		Recommended solutions: 1. The inverter can be forced to restart once if it is required by operation and if it is confirmed that there is no other problem; 2. Contact after-sales service personnel

INSTRUCTION:

*The actual display of “PV.VoltOver” is “PV1VoltOver” or “PV2VoltOver”.

*The actual display of “PV.Reverse” is “PV1Reverse” or “PV2Reverse”.

Chapter 5 User Interface

5.1 Description of LCD panel

The CPS SC14KTL-DO/US-208 LCD panel mainly consists of LCD screen, LED indicator lights, buzzer and 6 keys, as shown in Figure 5-1.

Interpretation for the indicator lights is shown in Table 5-1 and function of the keys is shown in Table 5-2.

Table 5-1 LED Indication

LED light	Name	Status	Indication
POWER	Working power light	Light on	Energized (control panel starts to work)
		Light off	Power supply not working
RUN	Grid-tied operation indication light	Light on	In grid-tied power generation state
		Flash	Derated running status (light up 0.5s, light off 1.6s)
		Light off	In other operation status or power supply not working
GRID	Grid status indication light	Light on	Grid is normal
		Flash	Grid fault (light up 0.5s, light off 1.6s)
		Light off	Power supply not working
FAULT	Fault status indication light	Light on	Indicates a Fault
		Slow flash	Indicates Alarm (light up 0.5s, light off 2s)

		Fast flash	Protective action (light up 0.5s, light off 0.5s)
		Light off	No fault or power supply not working

Table 5-2 Definitions of the keys

Key	Description	Definition of function
	Escape key	Back/end/mute
	Enter key	Confirm entering the menu/confirm set point
	Up	Page up in selection menu
	Down	Page down in selection menu
	Left	-1 when setting parameters
	Right	+1 when setting parameters

5.2 Operation state

Table 5-1 indicates the definitions of LED, i.e. indicates the information of the inverter's operation state. It indicates that the system is energized and under DSP control when "POWER" lights up.

"RUN" will light up when the inverter detects that the grid connection conditions meet the requirements and power is fed into the grid. "RUN" will blink if the grid is in derated running state during the period of feeding power into the grid.

"GRID" will light up when the grid is normal during the operation of the

inverter. Otherwise, “GRID” will blink until the grid restores to normal.

“FAULT” will blink quickly as a fault (except grid abnormality) occurs. “FAULT” will not light off until the fault is eliminated. The light will blink slowly when an alarm occurs. “FAULT” keeps being lighted up when an internal fault occurs.

The buzzer will give alarms if a fault (involving power grid abnormality) occurs.

5.3 Interface and menu functions

Users can perform the corresponding operations with the 6 function keys according to the indications of the LCD display.

5.3.1 Interface types

(1) The LCD interface starts with the company logo once the system is energized, as shown in Figure 5-2.

Figure 5-2 LOGO interface

(2) Indication of inverter operation mode:

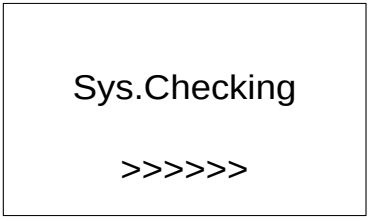


Figure 5-3 Inverter system check ongoing

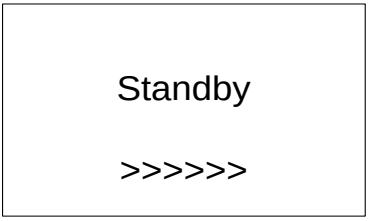
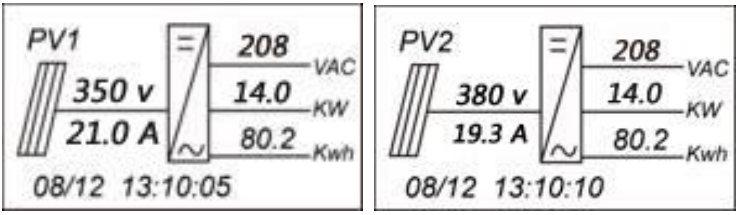


Figure 5-4 Inverter system in standby mode



(a) (b)

Figure 5-5 Default display interface for normal operation

Figure 5-6 Fault indication interface

LCD screen will display different mode interfaces based on the operation modes of the inverter. There are four operation modes: startup system check mode (as shown in Figure 5-3), stand-by mode (as shown in Figure 5-4), normal operation mode (as shown in Figure 5-5, the switching time between (a) and (b) is 5 seconds), and fault mode (as shown in Figure 5-6).

The default indication interface mainly indicates PV voltage, PV current,

grid voltage, instant power, daily generated power and time information under normal operation.

The fault information of the most recent / current fault will be indicated on the LCD screen when the inverter is in fault mode.

5.3.2 Main operation interface

LCD screen displays “default indication interface” when the inverter is in operation mode. Press ESC in this interface to escape the default interface and enter the main operation interface. The main operation interface is shown in Figure 5-7.

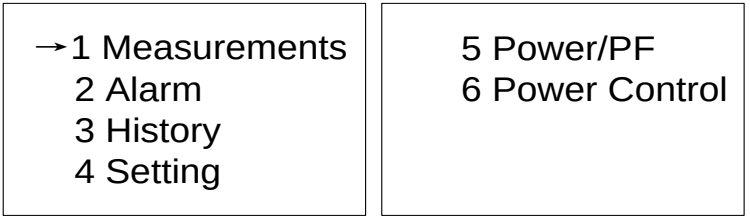


Figure 5-7 Contents indicated on the main operation interface

The main operation interface of LCD screen has 6 menus, i.e. “1 Measurements”, “2 Alarm”, “3 History”, “4 Settings”, ”5 Power/PF” and “6 Power Control”. The users may select options with PAGEUP and PAGEDOWN, and then press ENT to confirm selection. The users can return to the default indication interface by pressing ESC.

5.3.3 Operation information

When the cursor moves to “1 Measurements” in the main interface, you should press ENT to select the operation information as shown in Figure 5-8. Check the information by pressing PAGEUP and PAGEDOWN. Return to the previous menu by pressing ESC.

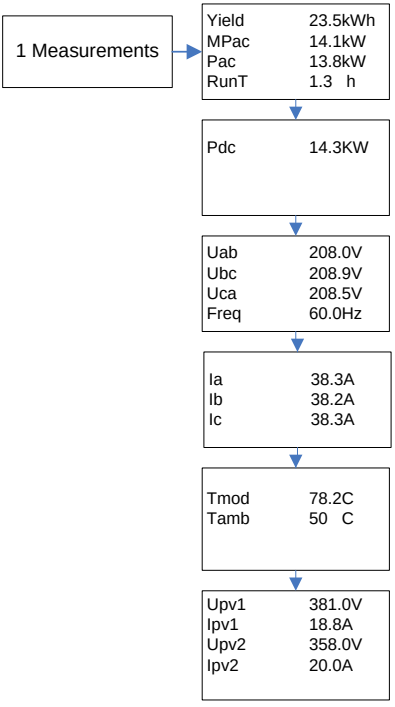


Figure 5-8 Operation information indication

5.3.4 Alarm

As described before, when faults occur during the normal operation of the inverter, corresponding fault message will be indicated in “2 Alarm” menu besides the sound and light alarms. Move the cursor to “2 Alarm” and press ENT to check out the specific fault information, as shown in Figure 5-9.

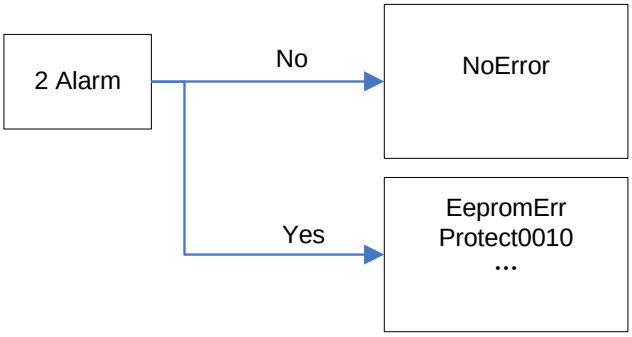


Figure 5-9 Alarm / failure information

5.3.5 History

Move the cursor to “3 History” in the main interface. Press ENT to check the history information, as shown in Figure 5-10. There are 4 submenus in “3 History” : “1 ErrHist”, “2 Recent Data”, “3 Version” and “4 Etot”.

(1) UP to 100 pieces of latest fault messages can be recorded and found in “1 ErrHist” menu.

(2) The latest 21 days’ operation history data is available to be found in “2 Recent Data” menu. All variable names in the data comply with the content in “1 Measurements” menu of the main interface. The users can select the “2 Recent Data” menu and input the retraceable days (For example, the input number is 21. If the current date is December 15th, the LCD will indicate the operation information of 21 days before that date which is November 24th).

(3) Software version, hardware version and serial number of the product are listed in “3 Version” menu.

(4) Cumulative generated power since the first day the inverter began working is available to be found in “4 Etot” menu.

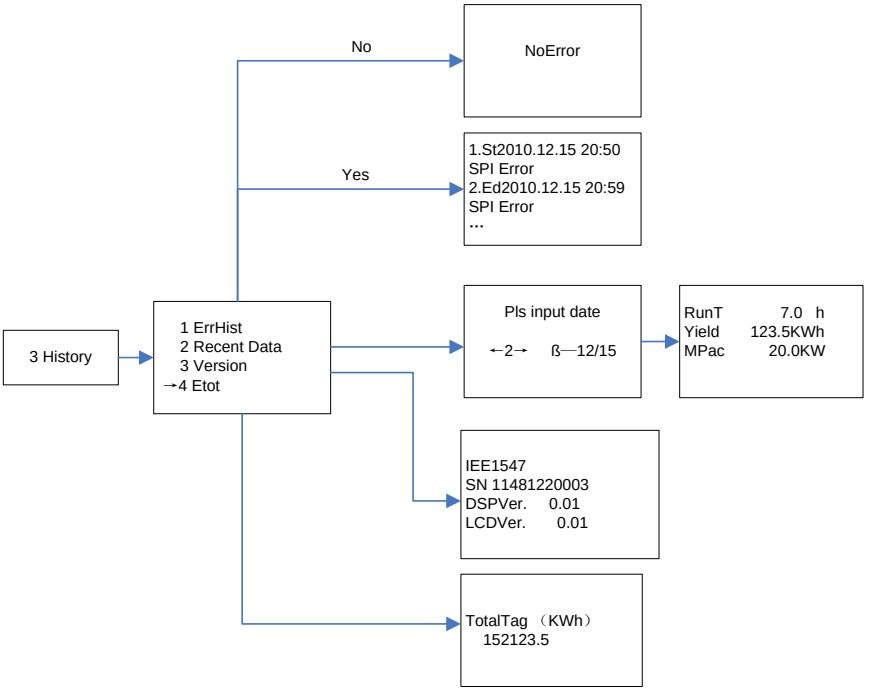


Figure 5-10 History menu and submenu

5.3.6 System setup

Move the cursor to “4 Setting” in the main menu, and press ENT to input the password (PAGEUP -> RIGHT -> PAGEDOWN -> LEFT). Then you can access the menu to set up the parameters. There are 7 submenus in “4 Setting” : “1 Power ON/OFF”, “2 Language”, “3 Sounds”, “4 Systime”, “5 Commun.”, “6 MPPT Scan” and “7 ARC Setup”.

(1) The inverter can be started and shut down with “1 ON/OFF” menu. Move the cursor to “ON” and press ENT, “ON State” will then be indicated at the bottom of LCD screen ; move the cursor to “OFF” and press ENT, then “OFF State” will be indicated as well. The inverter will stand by instead of working normally if the startup conditions are not met even “ON” is selected.

The inverter will be shut down immediately if “OFF” is selected in any cases.

(2) Two languages, i.e. English and Chinese are available in “2 Language” menu.

(3) Key beep and Alarm beep can be set mute/unmute in “3 Sounds” menu. “Key beep” and “Alarm beep” can be chosen by pressing PAGEUP and PAGEDOWN. Shift between “Enable” and “Disable” by pressing Left and Right if the cursor is on the “Key beep”. Complete the setup by pressing ENT. Similarly, the Alarm beep can be set up as well.

(4) Set up the system date and time with “4 SysTime” menu (These parameters are of critical importance and will be used in history information).

(5) Set the 485 communication parameters with “5 Commun.” menu.

(6) The “6 MPPTScan” menu has three submenus.

1. The first submenu is used to enable/disable the function of MPPT scan by pressing LEFT or RIGHT. Press ENT to confirm the selection. When the MPPT scan is enabled, the inverter will scan the MPPT automatically according to the scheduled cycle.

2. “Cycle(min)” is the second submenu used to set the cycle time of MPPT scan. Move the cursor to the submenu, press ENT, and use LEFT and RIGHT to set the cycle time. The range is (30, 540), and the unit is minute. Press ENT to confirm the selection, or press ESC to get back to the previous menu.

3. “Manual” is the third submenu used to enable the MPPT scan manually. Move the cursor to the submenu, press ENT to start MPPT scanning.

Note: The function is only effective when the “MPPTScan” is enabled.

(7) “7 ARC Setup” menu has two submenus, ie. “ARC Option” and “ARC Clear”.

1. “ARC Option” is used to enable/disable the ARC function.

2. “ARC Clear” is used to clear the ARC fault protection. When “ARC Protect” occurs, the system cannot clear the fault automatically. Please use “ClearErr” to clear the fault manually.

Note: The warning “ARCBoard Err” cannot be cleared by “ClearErr”, but this warning doesn’t affect the start-up of the inverter.

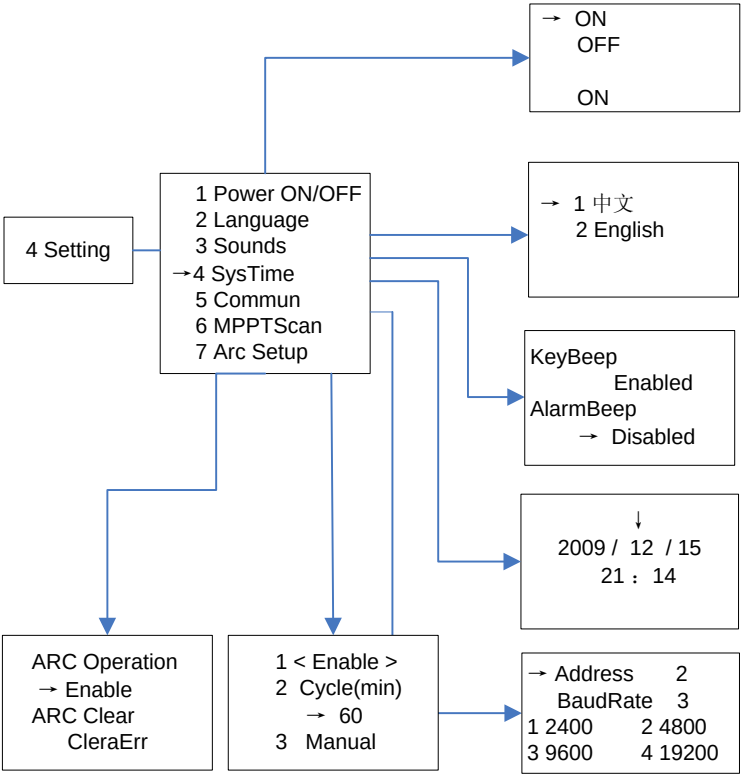


Figure 5-11 System setup menu and submenu

5.3.7 Power/PF

Move the cursor to “5 Power/PF” in the main interface. Press ENT to access and check the parameters of “ActivePower” and “PowerFactor”, as shown in Figure 5-12. The user can set the parameters of the two options through LCD operations as well as remote control by monitoring software.

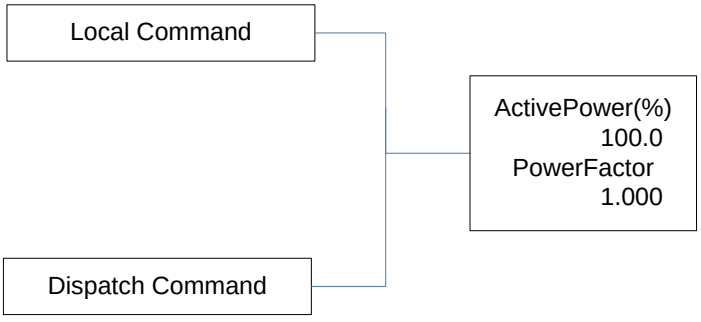


Figure 5-12 Options of Power/PF

5.3.8 Power Control

Press ENT to access the “Power Control” menu, as follows:

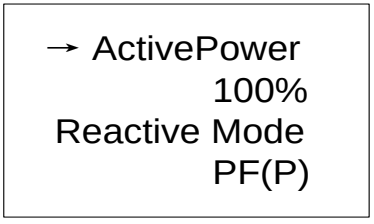


Figure 5-13 Power control menu

The active power parameters are adjustable from 0% to 100.0% in the “ActivePower (%)” menu.

You can select the specific reactive mode in the “ReactiveMode” menu.

The “ReactiveMode” menu has 6 submenus (Figure 5-14), including “1 None”, “2 Dispatch”, “3 Q Set”, “4 PF Set”, “5 PF(P) Set” and “6 Q(U) Set”.

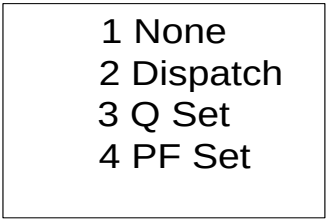


Figure 5-14 Submenus of ReactiveMode

1. None: No mode/Disable reactive mode
2. Dispatch: Remote power dispatch mode

Note: When the dispatch mode is selected, the reactive parameters of the inverter will change according to the remote change order, including ActivePower, PF and Q values.

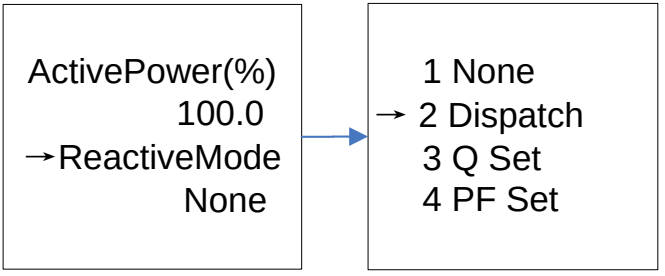


Figure 5-15 Enable the dispatch function

3. Q Set: Set the Q mode

Note: Change the reactive power by adjusting the Q value (reactive compensation)

4. PF Set: Set the PF mode

Note: Change the reactive power by adjusting the PowerFactor

5.3.9 System protection parameters setup

By pressing PAGEDOWN and ENT at the same time in the main interface

and entering the password (PAGEUP -> PAGEDOWN -> RIGHT -> LEFT), the system parameter setup menu is accessed. This menu includes 4 submenus: “1 Syspara”, “2 Restart”, “3 Recover” and “4 ClrErrRecd”, as shown in Figure 5-16.

(1) Set up the system protection parameters in “1 Syspara” menu. The specification of protection parameters is shown in Table 5-3.

Table 5-3 Protection Parameters Table

No.	LCD indication	Description	Setup range (lower limit, default & upper limit)
1.	V.MaxI (V)	Class I Max. grid voltage	{224.0, 228.8, 249.0}
2.	VmaxTripTI (S)	Class I Max. trip time	{0.08, 1.00, 600.00}
3.	V.MinI (V)	Class I Min. grid voltage	{104.0, 183, 187.0}
4.	VminTripTI (S)	Class I Min. grid voltage trip time	{0.08， 2.00, 600.00}
5.	V.MaxII (V)	Class II Max. grid voltage	{0, 249.6, 485.0}
6.	VmaxTripII (S)	Class II Max. grid voltage trip time	{0.08, 0.16, 600.00}
7.	V.MinII (V)	Class II Min. grid voltage	{100.0, 104, 183.0}
8.	VminTripTII (S)	Class II Min. grid voltage trip time	{0.08, 0.16, 600.00}
9.	F.MaxI (Hz)	Class I Max. grid frequency	{60.00, 60.5, 63.00}
10.	FmaxTripTI (S)	Class I Max. grid frequency trip time	{0.08, 300, 600.00}
11.	F.MinI (Hz)	Class I Min. grid frequency	{57.00, 59.3, 60.00}

12.	FminTripTI (S)	Class I Min. grid frequency trip time	{0.08, 300, 600.00}
13.	V.MaxRecover	Max. grid voltage recover value	{208.0, 225, 249.0}
14.	V.MinRecover	Min. grid voltage recover value	{104.0, 186, 208.0}
15.	V.RecoverT (S)	Grid voltage recover time	{0.08, 300, 600.00}
16.	F.MaxRecover	Max. grid frequency recover value	{50.00, 60.4, 62.00}
17.	F.MinRecover	Min. grid frequency recover value	{58.00, 59.4, 60.00}
18.	F.RecoverT	Grid frequency recover time	{0.08, 300, 600.00}
19.	PVStartVol (V)	PV startup voltage	{150.0, 295, 310.0}
20.	SoftStep (KW/S)	Soft step	{0.1, 0.1, 1}

(2) “2 Restart” menu. If an internal fault shutdown happens, a severe fault has occurred inside the inverter. The user may perform a force restart once in this menu if the user needs to restart the inverter.

INSTRUCTION:

The “Restart” function is effective only when the fault “IntFault0010-0150” in the troubleshooting table occurs. The inverter may restore to normal operation automatically if alarm or protection faults occur. This function will not respond when the inverter is in operation mode and a “FaultOperated” alarm interface will be indicated.

(3) “3 Recover” menu, the manufacturer’s parameter default value can be

restored when the inverter is not in operation mode. Otherwise, a "FaultOperated" will be prompted.

(4) In "4 ClrErrRecd" menu, history information of the faults can be cleared. A confirmation is required to clear the records.

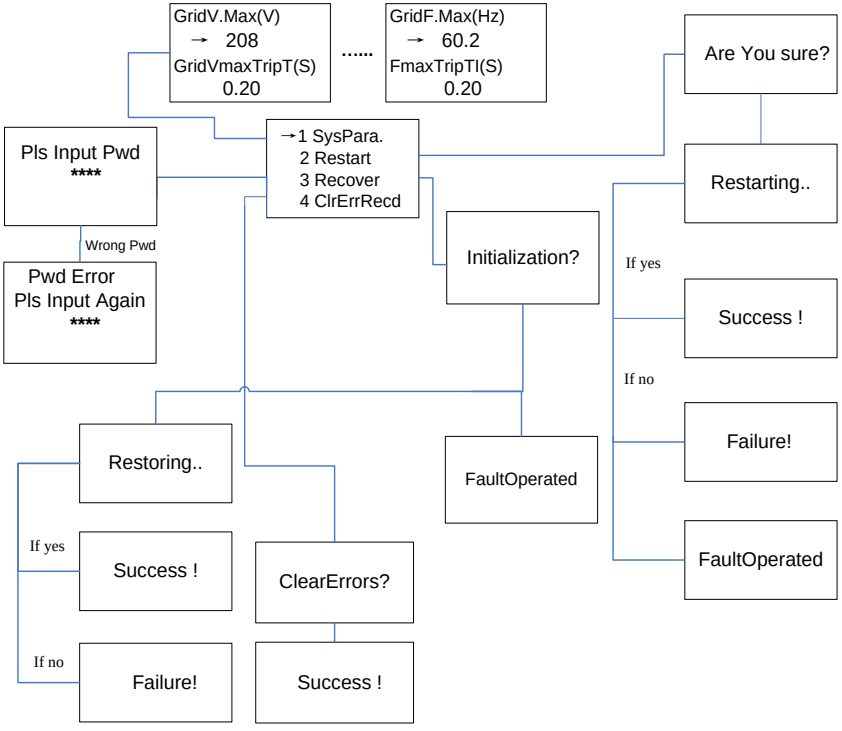


Figure 5-14 System parameter setup

Chapter 6 Technical Data

Model Name	CPS SC14KTL-DO/US-208
DC Input	
Max. PV Power	19kW
Nominal DC Input Power	14.6kW
Max. DC Input Voltage[1]	600Vdc
Operating DC Input Voltage Range	180-580Vdc
Start-up DC Input Voltage / Power	300V / 100W
Nominal DC Input Voltage	400Vdc
Number of MPP Trackers	2
MPPT Voltage Range	300-540Vdc
Max. Input Current (Imp)	50A (25A per MPPT)
Max. short circuit current limit per MPPT	45A
Number of DC Inputs and Fuses	8 fused conductors (4 per MPPT)
DC Disconnection Type	Load rated DC switch
AC Output	
Rated AC Output Power	14kW
Max. AC Output Power	14kW
Rated Output Voltage	208Vac
Output Voltage Range	183-228Vac
Grid Connection Type	3Φ/ N / PE
Max AC Output Current	39A
Rated Output Frequency	60Hz
Output Frequency Range	57-63Hz

[1] Exceeding the rated voltage shown in “Max. DC Input Voltage” may cause permanent damage to the equipment.

Power Factor	>0.99 (±0.8 adjustable)
Current THD	<3%
AC Disconnection Type	Load rated AC switch
System	
Topology	Transformerless
Max. Efficiency	96.7%
CEC Efficiency	96.0%
Stand-by / Night Consumption	<20W / <2W
Environment	
Protection Degree	NEMA 4
Cooling	Variable speed cooling fans
Operating Temperature Range	-13°F to +140°F / - 25°C to +60°C (derating from +122°F / +50°C)
Operating Humidity	0-95%, non-condensing
Operating Altitude	6562ft / 2000m (derating from 4921ft / 1500m)
Audible Noise	<55db
Display and Communication	
Display	LCD + LED
Communication	RS485
Mechanical Data	
Dimensions (WxHxD)	21.4x41.7x8.5in / 544x1060x215mm
Weight	141lbs / 64kg
Safety	
Safety and EMC Standard	UL1741:2010, CSA-C22.2 NO.107.1-01, IEEE1547; FCC PART15
Grid Standard	IEEE1547: 2003, IEEE1547.1: 2005

Note[1]: The output power of CPS SC14KTL-DO/US-208 inverter de-rates when the DC voltage of is lower than 300V. (See Figure 6-1)

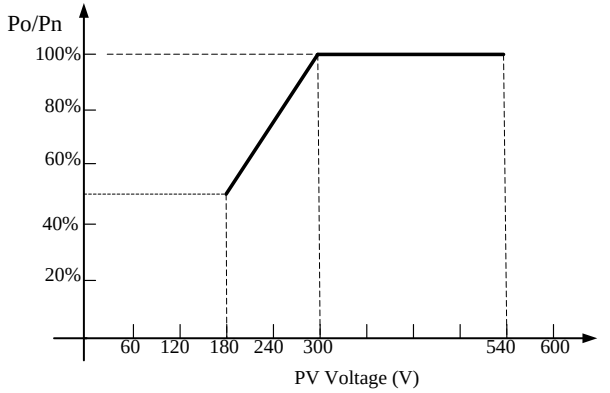


Figure 6-1 DC voltage de-rating curve

Note[2]: The output power of CPS SC14KTL-DO/US-208 inverter de-rates when the environmental temperature is higher than 122℉(50℃). (See Figure 6-2)

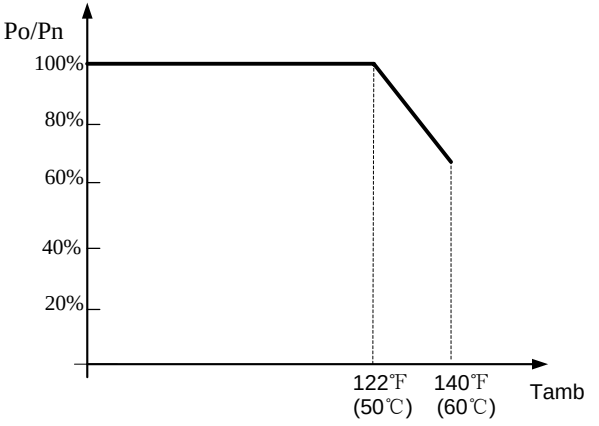


Figure 6-2 Environmental temperature de-rating curve

Chapter 7 Limited Warranty

The warranty policy of this product is specified in the contract; otherwise, the warranty period is 5 years.

For service, Chint Power Systems America will provide local support. For Warranty terms, please refer to the CPS America standard warranty policy in place at time of purchase

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